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The Management of Resources and the Resource of Management

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THE MANAGEMENT OF RESOURCES AND THE RESOURCE OF MANAGEMENT

ABSTRACT

This paper argues that the resource-based approach of deductive economics, the dynamic capabilities approach of strategy process, and organization theory research on organizational learning need to be joined in the next generation of resource-based research. This suggested redirection of resource-based research implies a return to a "resource-learning" theory of the firm begun by Penrose (1959). A synthesis of resource-based theory and learning theory allows us to examine how two sources of firm heterogeneity (resources and mental models) are intertwined.

THE MANAGEMENT OF RESOURCES AND THE RESOURCE OF MANAGEMENT

A consensus is beginning to emerge in strategic management that calls for an active attempt to increase the dialogue between behavioral and economic approaches to strategy issues (Amit and Schoemaker, 1993; Barney, 1992; Eisenhardt, 1989; Mahoney, 1992b; Schoemaker, 1993; Zajac, 1992). In the spirit of this pluralistic and balanced approach (Bowman, 1990; Rumelt, Schendel and Teece, 1991), it is suggested that the literature on organizational learning (behavioral literature) can and should be united with the emerging resource-based view of the firm (a more economic approach). Specifically, this paper argues that a holistic approach which combines behavioral logic with economic logic is necessary for advancing the theory of invisible assets (Itami and Roehl, 1987) and sustainable competitive advantage.

Williamson (1991) notes the uncertainty of whether the **dynamic capabilities approach** (Nelson and Winter, 1982; Prahalad and Hamel, 1990; Rumelt, 1984; Teece, 1990) -- in which organizational learning should certainly be a part -- and the **resource-based approach** (Barney, 1991; Conner, 1991; Peteraf, 1993; Wernerfelt, 1984) will play out individually or in combination. The argument here is that communication can and should flow freely between participants of the two approaches. In fact, the two approaches naturally blend into each other (Mahoney and Pandian, 1992).

The logic of the paper consists of two sections, with each section supporting an overriding idea. Section 1 presents the fundamental contributions of the resource-based approach. It is argued that researchers who wish to narrow the resource approach to a static equilibrium model run the risk of stagnation with an inability to sustain interest in the conversation about resources. Section 2 maintains that the substantial literature on organizational learning provides some guidance for strategy research on core competencies and capabilities-based competition.

The major thesis of the paper is that the combination of economic and behavioral approaches is the best way forward in strategy. In particular, economics-based research (the management of resources) and research on organizational learning (the resource of management) need to be joined in the next generation of resource-based research.

1. THE RESOURCE-BASED VIEW OF THE FIRM

Economic Rent. Strategy is constrained by, and dependent on, the firm's resource profile (Collis, 1991; Tallman, 1991). In the resource-based view, the concept of strategy is considered as a "continuing search for rent" (Bowman, 1974, p.47) and sustainability of rent, where rent is defined as return in excess of a resource owner's alternative use costs. Resources are the basic unit of analysis (Grant, 1991b). A resource may be conveniently classified under a few headings -- for example, financial, physical, human, organizational, technological, and intangible (Grant, 1991a; Hofer and Schendel, 1978) -- but (the key idea is that) the sub-division of resources may proceed as far as is useful for the problem at hand (Penrose, 1959).

In contrast to (strong form) efficient market theorists, **most resource-based theorists insist that short-term economic rents are possible** (Schoemaker, 1990). Experience suggests that there are $20 bills waiting to be picked-up off the ground. Resource-based strategists suggest that practioners be alert for picking up those $20 bills. Adam Smith would have approved.

Rents may be achieved by owning a valuable resource that is scarce (Ricardo, 1817). Resources yielding Ricardian rents include ownership of valuable land, locational advantages, and various forms of property rights (Rumelt, 1984). Second, monopoly rents may be achieved by government protection or by collusive arrangements when barriers to potential competitors are high (Conner, 1991). Third, entrepreneurial (Schumpeterian) rent may be achieved by risk-taking and entrepreneurial insight in an uncertain/complex environment (Rumelt, 1987; Schumpeter, 1934).

Fourth, the firm may be able to appropriate rents when resources are firm-specific (Aharoni, 1993). The difference between the first-best and second-best use value of a resource -- the so-called **composite quasi-rent** (Klein, Crawford and Alchian, 1978) -- is precisely the amount that a firm may appropriate to achieve above-normal returns. Composite quasi-rents are appropriable from idiosyncratic physical capital, human capital and dedicated assets, and these are regarded as massively important in a modern industrial economy (Mahoney, 1992c; Williamson, 1985). The key question concerns the empirical significance of co-specialized assets (Robins, 1992a; Teece, 1990) since composite quasi-rents are the outcome of deployment of complementary (co-specialized) resources.

Resources and Capabilities. Heterogeneous firm-specific resources and capabilities are the foundation for the resource-based view of the firm (Rumelt, 1984; Montgomery and Wernerfelt, 1988). The logic of generating and sustaining rents suggests that rents are derived from services of durable resources that are relatively important to customers and are simultaneously superior, imperfectly mobile, imperfectly imitable, specialized, imperfectly substitutable, and are not entirely appropriable by others when they are nontradeable or traded in imperfect factor-markets (Barney, 1991; Dierickx and Cool, 1989; Peteraf, 1993). The fundamental normative suggestion for firm action is that the firm select its strategy to generate rents based upon their resource capabilities and a "dynamic fit" with environmental opportunities (e.g., customers, competitors, and technology).

An important idea that is sometimes overlooked in the resource-based literature is that the catalyst for the resource-based theory is the resource of management. As Penrose suggests: "the experience of management will affect the productive services that all its resources are capable of rendering" (1959, p.5). The firm's managers recombine the firm's resources. Managing resources and skills are the key to a sustainable competitive advantage (Aaker, 1989).

Distinctive or core competencies and awareness of corporate resources have long been a cornerstone of strategy (Andrews, 1980, pp. 63-71; Ansoff, 1965, pp. 90-102; Hofer and Schendel,

1978, pp. 144-153; Selznick, 1957, pp. 42-56). Core competencies and superior organizational routines in one or more of the firm's value-chain functions may enable the firm to generate rents from a resource advantage (Hitt and Ireland, 1985; Prahalad and Hamel, 1990). **Core competencies are a function of the tacit understanding, skills and resources which a firm accumulates over time.** Core competencies that accumulate over time must satisfy a customer need better than a competitor (Bogner and Thomas, 1992). The resource accumulation process may help cultivate a firm's core competencies (Prahalad and Hamel, 1990). Conversely, core competencies are a catalyst to resource accumulation (Verdin and Williamson, 1992).

Penrose argues that: "It is the heterogeneity .... of the productive services available or potentially available from its resources that gives each firm its unique character" (1959, p.75). The relationship between heterogeneity and competitive advantage may be best understood within a path-dependency perspective (De Leo and Buttignon, 1992). For example, managerial expertise in a diversified enterprise can be a core (rent-generating) resource if it uniquely contributes to the sustained profitability of the enterprise (Castanias and Helfat, 1991). Managerial skills in combination with other firm resources can jointly produce rent. Indeed, the key to the management of resources, is the resource of management.

The Management Team. The attributes of the management team may satisfy the conditions for achieving and maintaining competitive advantage. The management team is valuable when they exploit opportunities and/or neutralize threats in a firm's environment. The management team may be rare in terms of firm-specific knowledge of individual managers as well as knowledge embedded in the team. Relatedly, the accumulation of firm-specific knowledge may lead to imperfectly imitable advantages for firms that have assembled competent management teams. Unique historical conditions, causal ambiguity and social complexity all contribute to the sustainability of competitive advantage (Barney, 1991; Demsetz, 1973; Powell, 1992b). Finally, in many cases management teams are non-

substitutable. Other managers and management teams will simply lack the knowledge of the particular circumstances and unique historical context in which actions need to be interpreted.

Barney notes that: "managers are important in the resource-based model, for it is managers that are able to understand and describe the economic performance potential of a firm's endowments. Without such managerial analyses, sustained competitive advantage is not likely" (1991, p.117). A firm may achieve rents not because it has better resources, but rather the firm's core competencies involve making better use of its resources (Penrose, 1959, p.54). The firm may make better use of human resources by correctly assigning workers to where they have higher productivity in the firm (Prescott and Visscher, 1980; Tomer, 1987), and the firm may make better allocations of financial resources toward high yield uses (Williamson, 1985). Fiol (1991) champions this Penrosean theme by considering how managers of a firm make sense of their stock of assets and manage the process by which resources are used and renewed.

A rich connection among the firm's resources, core competencies and the schemas or 'dominant logic' (Prahalad and Bettis, 1986) of the managerial team drives the diversification process (Ginsberg, 1990; Grant, 1988). Penrose argues that unused productive services of resources "shape the scope and direction of the search for knowledge" (1959, p.77). Core competencies involve both resource conversion activities and cognition (mental models). Furthermore, Penrose (1959, p.119) argues that the intertwining of resources and core competencies form the basis for sustained competitive advantage:

> Diversification and expansion based primarily on a high degree of competence and technical knowledge in specialized areas of manufacture are characteristic of many of the largest firms in the economy. This type of competence together with the market position it ensures is the strongest and most enduring position a firm can develop.

The services and rents that resources will yield depend upon the dominant logic of the resource of the management team, but the development of the dominant logic of the resource of the managerial team is partly shaped by the resources with which they deal. Mental models of managers are shaped by the

availability of resources (or the lack thereof). Current resources and capabilities that the firm possesses now and/or the firm's current commitment to core competence development affect human cognitive processes for strategy formation within the firm. Current resources and capabilities serve as a "cognitive driver" for future strategy (Itami and Numagami, 1992). This notion that the firm's current resources and capabilities influence managerial perceptions and hence the direction of growth seems to be an underdeveloped idea in the resource-based approach and is addressed in section 2 below.

Penrose (1955) considers the growth of the firm as limited only in the long-run by its internal management resources. The total managerial services that a firm requires at a point in time are partly constrained by the necessity to run the firm at its current level of operations, and is partly required to carry out expansionary ventures (Hay and Morris, 1991). The training of new managers and their integration into the work-force occupy some of the time and attention of existing managers, and thus reduce the managerial services available for expansion. In Penrose's theory "management (is) both the accelerator and the brake for the growth process" (Starbuck, 1965, p.490). The logic here is similar to Ghemawat's (1991) idea of **commitment** (i.e., earlier choices constrain later ones). Thus, there is a managerial constraint on the growth rate of the firm, the so-called "Penrose theorem" (Marris, 1964, p.114), which suggests that fast-growing firms in one period tend to experience slower growth in the next period (Shen, 1970; Slater, 1980a). Fundamentally, Penrose's analysis is an evolutionary theory where firm action takes place sequentially in historical (real) time (see also Dierickx and Cool, 1989 on "time compression diseconomies").

In addition to analyzing the limits of the growth of the firm, Penrose (1959) also examines the motives for expansion. Penrose (1959) presents a **resource approach** arguing that firms are administrative organizations and collections of physical, human and intangible resources. Unused productive services from existing resources present a "jig-saw puzzle" for balancing processes

(Penrose, 1959, p.70). Excess capacity due to indivisibilities, and cyclical demand, to a large extent drives the diversification process (Chandler, 1962; Farjoun, 1993). An optimal growth of the firm involves a balance between exploitation of existing resources and development of new resources and capabilities (Penrose, 1959; Rubin, 1973; Wernerfelt and Montgomery, 1988).

Penrose makes a crucial distinction between resources and capabilities (services of resources): resources consist of a bundle of potential services and can, for the most part, be defined independently of their use, while services cannot be so defined, the very word 'service' implying a function, an activity" (1959, p.25). In more modern terms, Penrose (1959, 1985) is suggesting that resources are stocks and capabilities (services) are flows (Dierickx and Cool, 1989).

The firm's capabilities lie upstream from the end-product -- it resides in skills, capacities, and a dynamic resource mix which may find a variety of end uses (Caves, 1984; Teece, 1982). Excess physical capacity leads to related diversification if the capacity is end-product specific (Chatterjee and Wernerfelt, 1991; Ramanujam and Varadarajan, 1989). Product/market portfolio strategy, governance structure choices and resource profiles are intertwined (Chatterjee, 1990; Itami and Roehl, 1987).

At all times there exists within every firm, pools of unused productive services, and these, together with the changing knowledge of management, create unique productive opportunities for each firm (Chandler, 1992). Companies grow in the directions set by their capabilities and these capabilities slowly expand and change (Montgomery and Hariharan, 1991; Penrose, 1960).

Dynamic Firm Capabilities. The resource-based approach may be framed in a dynamic context (Teece, Pisano and Shuen, 1993). Schumpeterian competition involves carrying out "new combinations" including new methods of production as well as organizational innovation. This Schumpeterian competition may be translated into the resource-based framework by considering the firm's "new combinations of resources" (Penrose, 1959, p. 85) as a means to achieving sustained

competitive advantage (Ghemawat, 1991; Oster, 1990). Penrose (1959), following Schumpeter (1934), views the competitive process as dynamic involving uncertainty, struggle and disequilibrium. Firms accumulate knowledge as a strategic asset (Winter, 1987) through R&D and learning, some of it incidental to the production process.

Innovation processes can be viewed as "resource transformation processes" (Moenaert, 1992; Nonaka, 1991). Nelson (1991) argues that strategic management should focus on firm-specific dynamic capabilities in a Schumpeterian (evolutionary) context. Firm-specific dynamic capabilities are a potential source of durable, not easily imitable, differences among firms (Teece, 1990). To generate economic value the organization must continually upgrade its core competencies. The firm's core competencies may be defined by the set of shared value systems, substantive routines and recipes (Spender, 1989) used by management. Managers' past decisions, decision rules, and tacit understandings derived from experience are the basic genetics which firms' possess. Sustainable advantage is thus a history (path) dependent process (Arthur, 1988; Barney 1991; Kagono, Nonaka, Sakakibara and Okumura, 1985; Nelson and Winter, 1982).

Arthur (1989) argues that under increasing returns to scale, if one product achieves advantage, its increased probability of doing well in the market will further enhance expectations of its success. Thus, expectations may interact with self-enforcing mechanisms to further enhance first-mover advantages. Barney (1986) extends the idea of path dependency beyond product development by considering the idea of corporate culture as a source of sustained competitive advantage. A rare and valuable culture may be imperfectly imitable due to a unique path-dependent history and may therefore be sustainable (Fiol, 1991).

The essential theoretical concept for explaining the sustainability of rents in the resource-based framework is "isolating mechanisms" (Reed and DeFillippi, 1990; Rumelt, 1984). The notion of isolating mechanism (at the firm level of analysis) is an analogue of entry barriers (at the industry

level) and mobility barriers at the strategic group level (Caves and Ghemawat, 1992; McGee and Thomas, 1986). Porter (1991) notes that the conditions which make a resource valuable and sustainable bear a strong resemblance to the conditions that make an industry attractive. (In addition to Porter's insightful comment, the intellectual history of "the theory of value" can be brought to bear on the question: What makes a resource valuable?) In this sense, the resource-based view utilizes a central concept of the structure-strategy-performance paradigm (i.e., barriers to imitation) albeit at a different level of analysis. These isolating mechanisms (barriers to imitation) explain (ex post) a stable stream of rents and provide a rationale for intra-industry differences among firms (Rumelt, 1991).

Examples of isolating mechanisms (both efficiency and market power) are derived from the resource-based theory, mainstream strategy research, organizational economics and the industrial organization literature (Mahoney and Pandian, 1992). Absent government intervention, isolating mechanisms exist because of the rich connections between uniqueness and causal ambiguity (Lippman and Rumelt, 1982). Invisible (intangible) assets and organizational capabilities are the most likely candidates for resources that are unique and causally ambiguous (Hall, 1992; Itami and Roehl, 1987: Teece, 1990). Invisible assets include experience, information, know-how, management skills, brand name, image, reputation, relationships, corporate culture, customer loyalty, trust, knowledge of customer preferences, and the ability to process information. Arguably, in an information-rich world the most important and scarce economic resource is capacity for attention and thinking (Simon, 1982, p. 116).

The accumulation and deployment of these invisible resources and capabilities are the primary source of sustainable competitive advantage (Ghemawat, 1986). The heart of invisible resources involve tacit understanding and articulable information both as a stock and as a flow. Information flow may be of three types: environmental information flow (e.g., learning customer preferences),

corporate information flow (e.g., proactively building brand name and reputation), and internal information flow (e.g., increasing information-processing capabilities). Clearly, advances in information theory and learning are critical to the resource-based view.

In fact, it may be argued that the deductive language game of the resource-based theory in terms of both conceptual work (Barney, 1991; Dierickx and Cool, 1989) and formal models (Lippman and Rumelt, 1982; Slater, 1980b) has lead us toward focusing on learning and "capabilities-based competition" (Stalk, Evans and Shulman, 1992). Or put differently, the so-called "content" side of strategy has begun to highlight the importance of "process" research on learning and maintaining organizational capabilities (Powell, 1992a; Ulrich and Lake, 1990). Process research on resources follows content research "like the left foot follows the right" (Mintzberg, 1990). The following section focuses on the concept of organizational capabilities and suggests that the literature on organizational learning should be brought to bear on the study of resources.

2. ORGANIZATIONAL LEARNING AND ORGANIZATIONAL CAPABILITIES

The focus on organizational capabilities is a dominant theme of strategy research in the early 1990's. An emphasis is placed on the need to upgrade rent-generating resources in an on-going process (Lado, Boyd and Wright, 1992). The firm must constantly reinvest to maintain and expand existing capabilities in order to inhibit imitability. Chandler (1990, p.36) emphasizes the creation, maintenance and expansion of resources and organizational capabilities as the key to competitive advantage:

> (O)rganizational capabilities included, in addition to the skills of middle and top management, those of lower management and the work force. They also included the facilities of production and distribution acquired to exploit fully the economies of scale and scope. Such capabilities provided the profits that in large part financed the continuing growth of the enterprise. Highly product-specific and process-specific, these organizational capabilities affected, indeed, often determined, the direction and pace of the small numbers of first-movers and challengers, and of the industries and even the national economies in which they operated.

Chandler (1990) provides a wealth of evidence in support of the Penrosean notion that resources and organizational capabilities provide an internal dynamic for the growth of the firm. The history of sustained competitive advantage by industrial enterprises frequently involved a three-pronged investment of manufacturing (i.e., experience in production), marketing (e.g., knowledge of customers), and management (e.g., knowledge in training and recruiting workers). Nelson reinforces Chandler's historical perspective arguing for "an emerging theory of dynamic firm capabilities" (1991, pp. 67-68). Some practitioners and academics have gone so far as to suggest that learning is the only sustainable source of advantage (Stata, 1989; Williams, 1992).

Creating, constructing, and sustaining competitive advantage dictates a transformation of core competencies. The most critical core competence is organizational learning, the process whereby shared understandings change (Senge and Sterman, 1991). In fact, organizational learning may be usefully considered a "meta-competence" or "meta-skill" that directs the resource conversion activities of the firm and is a source of sustainable competitive advantage (Crossan, Lane, Rush and White, 1992; Klein, Edge and Kass, 1991; Senge, 1990). Competence in organizational learning may involve both the content of knowledge and the rate of learning. Organizational learning is the process whereby management teams change their shared mental models of their company, their markets, and their competitors (De Geus, 1988; Stata, 1989). Shared mental models of markets might include customer segments served, customer functions served, and technologies utilized (Abell, 1980).

Cyert and March suggest that: "organizations change their goals, shift their attention, and revise their procedures for search as a function of their experience" (1963, p.123). Organizational learning involves the full-learning cycle of the educational philosopher John Dewey -- the process of discovery, invention, production, and reflection. The theory-in-use approach of Argyris and Schon (1978) may be used by organizations to overcome systematic errors of judgment and choice (Hogarth, 1987; Kahneman, Slovic and Tversky, 1982). Organizational learning may be operationalized as a

"shift in organizational theory-in-use mediated by organizational inquiry" (Schon, 1983b, p.128). The process of learning to learn requires that organizations keep themselves open to deep and challenging questions rather than trying to develop fixed foundations for action (Morgan, 1986). Top management must accept dissents, interpret events as learning opportunities, and view actions as experiments (Nystrom and Starbuck, 1984). Financial turnarounds often require "cognitive turnarounds".

Effective learning depends upon the acquisition, processing, storage, and retrieval of knowledge (Helleloid and Simonin, 1992). A pragmatic theory of knowledge and learning is that the content of knowledge (the "known") and process of learning ("knowing") are inextricably intertwined (Dewey and Bentley, 1949). Helleloid and Simonin (1992) provide an important contribution within the research agenda of combining content and process research in strategy -- a Deweyan perspective. The process of knowledge acquisition by an organization (i.e., acquiring knowledge by internal development, assisted internal development, open market procurement, inter-firm collaboration, or merger and acquisition) is intertwined with the content of organizational knowledge. The process of "knowing" influences the "known". The process by which knowledge is acquired has implications for how an organization processes, stores, and later retrieves knowledge. These processes enable the organization to continually upgrade their core capabilities.

Dynamic Organizational Capabilities and Organizational Learning. Leonard-Barton (1992) emphasizes the multidimensional aspects of core capabilities. First, an emphasis must be placed on employee knowledge and skills. Developing and maintaining employee competencies through effective **human resource practice** underpins organizational capabilities (Ulrich and Lake, 1991; Ulrich and Wiersema, 1989). Second, **technical systems** (e.g., data bases, decision rules) should accumulate, structure, and codify knowledge. This organizational memory (Walsh and Ungson, 1991) enables the firm to retain knowledge and build on the accumulated experience of its broad

constituency (Boulding, 1988). The knowledge inside human heads in combination with technical systems are arguably the most fundamental of the core capabilities of the firm (Itami and Numagami, 1992).

Third, **managerial systems** are required for creating (e.g., through structuring of networks) and controlling (e.g., through incentive systems) knowledge. The problem of creating incentives to reduce information asymmetries has been a consuming passion of agency theorists (Eisenhardt, 1989). Prescott and Visscher note that: "the firm is a storehouse of information, and within the [effective] firm incentives are created for the efficient accumulation and use of that information" (1980, p.446). **Systems, structures, and individual learning within an organization are intertwined.** Organizational capabilities include not only the human capital of the firm's employees but also the structure of organizational incentives which enable evaluation and transmission of skills and knowledge within the organization (Richardson, 1990). A key ingredient in the relationship between resources and competencies is the ability of an organization to achieve cooperation and coordination within teams (Grant, 1991b; Prahalad and Hamel, 1990). Finally, **values and norms** are infused through the first three dimensions (Barney and Ouchi, 1986; Fiol, 1991; Leonard-Barton, 1992). Norms influence the behavioral and cognitive development that an organization can undergo (Fiol and Lyles, 1985).

While Weick (1991) questions whether organizational systems are conducive for organizational learning, the organizational learning literature discussed above provides some confidence that learning can and does take place. Schon puts it better: "Reflection-in-action is essential to the process by which individuals function as agents of significant organizational learning, and it is at the same time a threat to organizational stability. An organization capable of examining and restructuring its central principles and values demands a learning system capable of sustaining this

tension and converting it to productive public inquiry. An organization conducive to reflective practice makes the same revolutionary demand" (1983a, p.338).

In order for the resource-based theory on organizational capabilities to advance, resource-based theorists need to come to grips with the process of organizational learning (Amit and Schoemaker, 1993; Hansen and Wernerfelt, 1989). The practical positive consequence of organizational learning means "a process of improving actions through better knowledge and understanding" (Fiol and Lyles, 1985, p. 803). In discussing organizational learning, we must be careful about reifying organizational learning. Learning takes place in individual human heads, and as Cohen (1991) notes, there is renewed interest by cognitive psychologists on learning and the exercise of skills by individuals (e.g., Singley and Anderson, 1989). Organizations learn either by the learning of its current members or by "grafting" (i.e., obtaining new members) (Huber, 1991; Simon, 1991).

Simon (1991) argues for the usefulness of research on "organizational learning" and contends that: "Employing a more aggregate level of discourse is not a declaration of philosophical anti-reductionism, but simply a recognition that most natural systems do have hierarchical structure and that it is sometimes possible to say a great deal about aggregate components without specifying the details of the phenomena going on within these components" (1991, p.126). In fact, both Nelson and Wright (1992), and Kogut (1992) suggest that the collective learning process can take on a strikingly national character, or at least used to.

For better or worse, individual learning in organizations is very much a social phenomenon (March, 1991; Simon, 1991). Although organizational learning occurs through individuals, organizational learning is not simply the sum of current members learning. Wisdom is often embedded in organizational routine (Cyert and March, 1963; Nelson and Winter, 1982).

Levitt and March (1988) observe that organizational learning is routine-based, history dependent and target oriented (i.e., influenced by departures from aspiration levels). Routines or "recipes" allow the organization to "remember by doing" (Spender, 1989). The firm may be viewed as a separate path dependent entity with an organizational memory including tacit knowledge (Eliasson, 1990; Polanyi, 1962). Nonaka (1991) provides some examples how companies like Matsushita Electric Company and Canon have learned how to go "from tacit to explicit" knowledge, and how these enterprises' workforces have a shared appreciation for the power of metaphor and analogy.

Some organizational learning is planned but more frequently it is emergent (i.e., acquired unintendedly or unsystematically). In fact, theories about genuine learning cannot be deterministic. In some sense, it is impossible to predict future knowledge. Popper (1979) argues that learning is neither deterministic nor random. Learning in this Popperian sense is evident in the Austrian theory of entrepreneurship as a discovery process (Hayek, 1978; Kirzner, 1979; Schumpeter, 1934).

Some learning (as emphasized by the literature on learning curves, Yelle, 1979) is experiential (i.e., first-hand experience) and some learning is vicarious (i.e., second-hand acquisition of knowledge). March, Sproull and Tamuz (1991) also consider learning from "near history" (e.g., simulating experience through scenarios). Causal ambiguity, however, reduces the impact of effective imitation and diffusion of knowledge (Lippman and Rumelt, 1982; Mahajan, Sharma and Bettis, 1988).

It is argued here that isolating mechanisms are not only the key explanation for sustaining rents but are also the major source of firm heterogeneity. In particular, causal ambiguity is a major source of isolating mechanisms and firm heterogeneity. Relatedly, firm heterogeneity -- a key premise of the resource-based approach -- may be due to firms' differential capabilities for organizational learning or their "absorptive capacity" (Cohen and Levinthal, 1990).

Resource Learning: A Synthesis. Spender (1992) concludes that "resource-learning" (i.e., human resources learning about the services of other resources) is the key to advancement in resource-based theory. This paper concurs with Spender's view and argues for a synthesis of the dynamic capabilities approach, organizational learning, and the deductive resource-based approach. Along these lines, Nelson (1991) suggests that firm dynamic capabilities to generate and gain from innovation are the source of durable, not easily imitable differences among firms. New learning, such as innovations, are the stocks and flows of a firm's "combinative capabilities" (Kogut and Zander, 1992) which generate new ideas and artifacts from existing knowledge. These combinative capabilities are often platforms into new markets.

In some sense, the argument that learning theory and resource-based theory should be combined is not a new thesis at all. Loasby (1991) notes that Penrose (1959) provides a subjective view in which the possibilities of using the productive services of resources change with changes in knowledge. Best (1990) provides detailed documentation that **Penrose's (1959) theory is a learning theory of the firm.** However, since Penrose's (1959) seminal work, the theory on resources and the theory on learning have developed in relative isolation. This paper calls for a redirection of the resource-based approach towards combining resource theory with organizational learning theory; a direction in which Penrose (1959) originally suggested.

The call for dialogue between process and content research has been a two-way street. While content researchers have emphasized the need for inquiry on the processes by which resources are used and renewed (e.g., Barney, 1992; Mahoney 1992b), process researchers have recently advocated a focus on resource-based theory and on how mental models of firm leaders play a critical role in directing the path of the resource accumulation process (e.g., Barr, Stimpert and Huff, 1992; Fiol, 1991).

So what? What difference would it make if the resource-based literature and the organizational literature remained separate islands of knowledge? These questions should not be asked in a sneering manner, but rather as part of the process of a sincere inquiry concerning the consequences of alternative research agendas. Pragmatically, few better questions can be posed. Resource-based analysis in isolation cannot be sufficient for management science because it cannot articulate management practices that will enable firms to earn rents. Process-oriented research is not sufficient because it cannot adequately distinguish strategically important aspects of management from practices or processes that have little strategic importance (Robins, 1992b).

The issue of the creation, maintenance, and sustainability of techniques for accumulating and deploying resources may become a focal point for research. This focus may involve not only process and content research in management science but also other fields such as political science. For example, in political science, Kennedy (1987) provides a resource-based view of nations. The benefits of accumulating resources via external expansion has often been outweighed by the great expense of it all.

The cross-fertilization of process and content research may bear fruit both for the advancement of scholarship and for management practice. The proposed research agenda demands that scholars in process research and content research, listen, really listen, to their colleagues and management practitioners (Mahoney, 1993).

The resource-based approach has allowed researchers with economics training to begin a dialogue with researchers trained in the behavioral and cognitive sciences. This is a healthy development. Maintaining artificial barriers in the trading of ideas has built up tensions that need release. The whole point of specialization, after all, is to be enriched by subsequent trade (McCloskey, 1985).

Combining the resource-based view of the firm (the management of resources) with research on cognitive models of managers (the resource of management) provides a new "conceptual lens" for what we mean by "managing". "Managing" involves a "discovery procedure" (Hayek, 1978) in which the heterogenous mental models of managers and the shared understandings of management teams are involved in an ongoing competition. Competition between firms involves not only competition between heterogeneous "bundles of resources" (Rumelt, 1984; Teece, 1982; Wernerfelt, 1984, 1989) but also competition between heterogeneous "mental models" (Barr, Stimpert and Huff, 1992; Fiol, 1991).

While this paper emphasizes the importance of "independent experiments" as a discovery procedure for the economic system, relatedly, Lant, Milliken and Batra (1992) demonstrate that top management heterogeneity increases the likelihood of organizational learning. While diverse mental models by organizations are healthy for an economic system (Nelson, 1991; Nelson and Winter, 1982), diverse mental models by individuals can be healthy for an organization.

This paper suggests that the two sources of firm heterogeneity (resources and mental models) are interrelated -- an important theme in Penrose (1959) that we only now seem ready to explore. Chandler's (1962) thesis illustrates how resources and mental models of managers interact. Some firms' managers were uniquely positioned to create a significant organizational breakthrough (e.g., the multidivisional form; Mahoney, 1992a). The accumulation of resources and the need for change demanded new mental models for coping with unprecedented diversification. **The accumulation of resources created a base for organizational learning. Conversely, organizational learning and new organizational forms allowed firms to increase their rate of resource accumulation.**

The importance of combining the resource-based theory of the firm with organizational learning is that we can begin to consider one of the more relevant managerial questions of our time posed by Chandler (1992): Why are American firms international leaders in industries such as aircraft

and aerospace, chemicals, computers, food processing, oil refining, and pharmaceuticals, whereas American firms in automobiles, consumer electronics, machine tools, and semiconductors have fallen behind? This paper argues that one answer to Chandler's question involves further study on the evolution of resource accumulation and the evolution of organizational capabilities via organizational learning. Resource based-theory can provide the resource criteria for a sustainable competitive advantage, while organizational learning theory can show us precisely how learning processes to utilize resources may be carried out.

The resource-based view may be strengthened by adding behavioral decision-making biases and organizational implementation aspects as further impediments to imitation of a firm's resources and capabilities (Amit and Schoemaker, 1993). While bounded rationality may be invoked to explain the maintenance of rents under conditions of high uncertainty/complexity, the bounded rationality condition is also an important concept for a theory of the generation of rents as well. Indeed, developing superior heuristics and improving group decision-making and organizational learning processes for the purpose of accumulating and deploying resources may arguably be the heart of strategic management.

Barney suggests that: "in the analysis of competitive advantage, process issues must always be integrated with content issues" (1992, p.56). In the context of resource-based theory, as elsewhere, there is no choice between content and process, pragmatically speaking. We must choose both and attempt to describe their complex relationship. By combining behavioral and economic approaches, we can do better in organization science research.

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